REMARKS

Status

Claims 32-38 were rejected under 35 USC 112, second paragraph as being indefinite.

Claims 32-38 were rejected under 35 USC 112, first paragraph as failing to comply with the enablement requirement.

Claims 33-35 and 37-38 were rejected under 35 USC 112, first paragraph as failing to comply with the written description requirement.

Claims 32-38 were rejected under 35 U.S.C. 103(a) as being unpatentable over Tornbolm (US 4,853,634) in view of Valleau et al. (US 5,028,100) and in further view of M..J. Woulds, "How to Cast Cobalt-Based Superalloys" or Culling (US 5,310,522), plus Burns et al. (US 6,042,898), optionally with Collins et al. (US 4,555,612).

Claims 32-38 were provisionally rejected on the ground of non-statutory obviousness-type double patenting over claims 16-29 and 31-32 of co-pending Application No. 10/525,026, in view of Burns et al. (US 6,042,898), optionally with Collins et al. (US 4,555,612) and optionally further considering M..J. Woulds, "How to Cast Cobalt-Based Superalloys" or Culling (US 5,310,522).

Claims 1-38 are canceled herein.

New claims 39-43 are presented herein for examination.

With respected to claims 32-38 being rejected under 35 USC 112, second paragraph as being indefinite:

Applicant has canceled claims 32-38 and presents new claims 39-43 that include symbol usage that more clearly and consistently identifies the claimed elements.

In regards to the limitations of claim 38, which has been canceled herein, Applicant presents new claim 43 in which Applicant has deleted the term "group" so that it is clear the element "M" is selected from among (Fe, Co, or Ni) but not the complete group of elements in the periodic table.

With respect to claims 32-38 being rejected under 35 USC 112, first paragraph as failing to comply with the enablement requirement:

Applicant has canceled the claims and presents new claims that recite that the second corrosion removal process includes the combination of the cleaning and activation step as taught in the specification at page 7, lines 1 and 13-18, page 9, lines14-16, page 10, lines 9-10, and original claim 4.

With respect to claims 33-35 and 37-38 being rejected under 35 USC 112, first paragraph as failing to comply with the written description requirement:

In regards to claim language correlating the depth of penetration of the eddy current with the depth of the penetration of the corrosion, applicant presents new claims 39-43 which more clearly include the supporting elements and operation, as disclosed in the specification and explained herein.

Specifically, new claim 39 recites, in relevant part:

"A method for manufacture of a main body made of a nickel- or cobalt-based superalloy parent material comprising:

... determining an area of corrosion on the main body by an eddy-current measurement using an eddy current probe which generates an alternating electromagnetic field at at least two different measuring frequencies (2mf) to ascertain a depth (δ_{ICO}) of the corroded areas,

wherein the at least two different measuring frequencies (2mf) include a low frequency (fl) used first and a high frequency (fh)used subsequently,

wherein the depth (δ_{ICO}) of the corroded areas is determined by the frequency change in the alternating electromagnetic field of the eddy current probe at each of the at least two different measuring frequencies (2mf),

wherein the depth (δ_{ICO}) of the area of corrosion determined using eddy-current testing is determined in relation to each of the selected high or low measuring frequencies (2mf),

wherein the area of corrosion is oxidated carbide corrosion or sulfidized corrosion;

removing the corrosion area by cleaning the main body using a first cleaning process and a second combined cleaning and activating process different from the first cleaning process,

wherein the first cleaning process is a grinding process and the second combined cleaning and activating process is a sputter process which activates the surface of the main body for an application of an anti-corrosive coating; applying the anti-corrosive coating, and

wherein the depth (δ_{ICO}) of the area of corrosion determined using eddy-current testing is determined in correlation to the applicable measuring frequency (2mf) by the equation (δ)= [503/($\sqrt{}$((f)• σ • μ_r)], where, (δ) is the depth of penetration of the eddy current, σ is the specific conductivity of the parent material, μ_r is the relative permeability of the parent material, and (f) = frequency = the applicable measuring frequency (2mf),

such that the frequency (f) at which the influence of the corroded areas predominates changes in the alternating electromagnetic field of the eddy current probe determines the applied measuring frequency (2mf) used in determining the depth (δ_{ICO}) of the corroded areas where (δ_{ICO}) = 503/($\sqrt{}$((2mf) • σ • μ_r),.

This passage from the claim generally presents that the eddy current measurements is performed by an eddy current probe using both a high frequency alternating electromagnetic field and low frequency alternating electromagnetic field where the change in the alternating field properties at each of the frequencies determines the sensed depth of the corroded areas of the main body.

New claim 42 recites, in relevant part:

"A method for the manufacture of a gas turbine blade with a cast main body of a nickel or cobalt based superalloy parent material, comprising:

... wherein a depth (δ_{ICO}) of the area of corrosion, which is determined using the eddy-current testing, is determined in relation to a measuring frequency (1mf),

removing oxide areas of oxidated carbides or sulfidized areas by cleaning the surface of the main body using a first cleaning process effective to remove the oxidated carbides or sulfidized parent material areas;

performing a second combined cleaning and activating process different than the first cleaning process, the second combined cleaning and activating process being ineffective for removing the corrosion area in the absence of the first cleaning process;

applying an anti-corrosive coating,

wherein the depth (δ_{ICO}) of the area of corrosion determined using eddy-current testing is determined in correlation to the applicable measuring frequency (1mf) by the equation (δ)= [503/($\sqrt{}$((f)• σ • μ_r)], where, (δ) is the depth of penetration of the eddy current, σ is the specific conductivity of the parent material, μ_r is the relative permeability of the parent material, and (f) = frequency = the applicable measuring frequency (1mf),

such that the frequency (f) at which the influence of the corroded areas predominates changes in the alternating electromagnetic field of the eddy current probe determines the applied measuring frequency (mf) used in determining the depth (δ_{ICO}) of the corroded areas where (δ_{ICO}) = 503/($\sqrt{}$((1mf) • σ • μ_r),.

This passage from the claim generally presents that the eddy current measurements is performed by an eddy current probe using an alternating electromagnetic field where the change in the alternating field properties at the applicable frequency determines the sensed depth of the corroded areas of the main body.

Both, new claim 39 and 42 recite in detail the method for determining the depth (δ) which the alternating electromagnetic field of the eddy current probe penetrates various types of parent material (which varies based on the specific conductivity or relative permeability of the parent material as well as the frequency of the alternating electromagnetic field) and correlates this depth (δ) to the depth (δ_{ICO}) of the corroded areas via an equation/formula.

Since the corroded areas in the parent material disturbs the alternating electromagnetic field of the eddy current probe, the depth of the corroded areas is determined to be where there is the greatest changes in the alternating electromagnetic field. A key to finding the correct depth (δ_{ICO}) of the corrosion areas is in knowing how deeply (δ) the alternating electromagnetic field penetrates the parent material at an applied frequency. The equation (δ) = 503/($\sqrt{}$(f • σ • μ_r), where σ is specific conductivity of the parent material and μ_r is relative permeability of the parent material explains how to find the depth (δ) the alternating electromagnetic field is penetrating the parent material having a known specific conductivity and a known relative permeability.

Essentially, given an applied frequency, the equation δ = 503/($\sqrt{}$(f • σ • μ_r) provides a method to determine how deep the eddy current probe signal is being transmitted into the parent material (with considerations provided for the properties of the parent material).

As recited in the claims, during-eddy current measurement the user checks for the applied or measuring frequency(s) [1mf or 2mf] that causes the greatest changes in the alternating electromagnetic field of the eddy current probe. When the user determines the appropriate measuring frequency (1mf or 2mf), it becomes the corrosion depth frequency (f) that is used (in the equation/formula) to determine how deeply the alternating electromagnetic field/signal is penetrating the parent material at that time. The depth (δ) of this penetration of the alternating electromagnetic field/signal is also the depth (δ_{ICO}) of the area of corrosion.

Support for the new claims and the above explanation is provided in the Specification at page 1, lines 2 to page 2, line 31, page 5, lines 4-31, and page 9, line 17 to page 10, line 4.

In summary, it is applicant's position:

1) The above cited Support passages combine to teach the claimed eddy current measuring method,

2) the new claims include the key operations and components for fully performing eddy current measurements as claimed,

3) the new claims include determining a specific frequency caused by the corroded areas (the frequency where the changes in the alternating field of the eddy current probe is predominant),

4) when the determined frequency and parent material variables are applied to the claimed equation ($\delta = 503/(\sqrt{(f \cdot \sigma \cdot \mu_r)},)$, the depth of the penetration of the corrosion can be determined, and

5) the forgoing is presented in the Specification, as originally filed, and is not New Matter.

In regards to the rejection of canceled claim 35, the relevant claim limitations are presented within new claim 41, which includes replacement of the word "component" with the word "blade" to overcome the Examiner's "New Matter" rejection.

In regards to the rejection of canceled claim 34, the relevant claim limitations are presented within new claim 40, which includes the phrase "visible on" to more clearly indicate the results of the eddy-current measurement are visible on the evaluation unit as is taught in the Specification at page 9, lines 25-26 and as suggested by the Examiner.

With respect to claims 32-38 being rejected under 35 U.S.C. 103(a):

New independent claims 39 and 42, which are applicable to the relevant dependent claims, inter-relate the frequency of the depth penetration of the alternating electromagnetic field with the depth of the corroded areas via the equations $(\delta) = 503/(\sqrt{(f \cdot \sigma \cdot \mu_r)}$ and $(\delta_{ICO}) = [503/(\sqrt{((2mf) \cdot \sigma \cdot \mu_r)}]$ and $(\delta_{ICO}) = [503/(\sqrt{((1mf) \cdot \sigma \cdot \mu_r)}]$, as applicable.

At page 5, lines 1-3 (of paragraph 5) the Examiner indicated the equation/formula was considered inconsistent with the specification and " … cannot be properly further treated with respect to the prior art."

Applicant herein presents new claims and supporting explanations above that more clearly elucidate the claim limitations including the use of the equation/formula and respectfully requests withdrawal of the applicable rejections.

With respect to claims 32-38 being provisionally rejected on the ground of non-statutory obviousness-type double patenting:

Applicant herein above presents new claims 39-43, new claim limitations, and supporting explanations that explicate the new and/or previously untreated claim limitations and respectfully requests withdrawal of the applicable rejections.

Conclusion:

Applicants respectfully request allowance of the present application in view of the foregoing amendments and arguments. The commissioner is hereby authorized to charge any appropriate fees due in connection with this paper, including the fees specified in 37 C.F.R. §§ 1.16 ©, 1.17(a)(1) and 1.20(d), or credit any overpayments to Deposit Account No. 19-2179.

Respectfully submitted,

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